The Papers read were:—

1. *Journey through the Mountainous Districts North of the Elbúrz, and Ascent of Demavend, in Persia.* By R. F. Thomson, Esq., and Lord Schomberg H. Kerr, of H. M. Mission in Persia.

Communicated by the Earl of Malmesbury, Foreign Office.

From the Hon. C. A. Murray, C.B., *&c., H. M. Minister in Persia, to the* Right Hon. the Earl of Malmesbury, *&c. &c.*

Camp at Lar, Aug. 2, 1858.

My Lord,—I have the honour to transmit herewith a narrative of an excursion in the Elbúrz chain of mountains, and of the subsequent ascent of the lofty mountain of Demavend, lately made by Mr. R. F. Thomson, first attaché to this mission, and by his colleague Lord Schomberg Kerr. As this grand and interesting mountain range is but little known either to the general or to the scientific public in England, I would respectfully request your Lordship to be kind enough to forward the narrative, with the accompanying map and specimens, to the President of the Royal Geographical Society. I feel assured that I am truly anticipating your Lordship's sentiments when I express an opinion that the zeal, energy, and intelligence exhibited by Mr. Thomson and Lord Schomberg Kerr on this excursion, and in the graphic description of it, reflect the highest credit upon them, especially when it is borne in mind that neither of them have had the advantage of any specially scientific education, and that they have been obliged to supply, in many instances from their own ingenuity, resources which would have been easily attainable in Europe. Notwithstanding the certain amount of fatigue which they necessarily had to encounter, it is evident from their narrative, as well as from the fact of the ascent of Demavend having been lately made by two gentlemen who accompanied them, and by two members of the Russian Mission, none of whom were practised mountain pedestrians, that there is no mountain in the world, of the same elevation, the ascent of which is attended with so little risk or difficulty, its crater being at least 6000 feet higher than the summit of Mont Blanc, which, even with the aid of the skilful and experienced Swiss guides, it is generally a work of greater labour and duration to attain. Mount Ararat, which has long been considered the monarch of the great mountain chain extending over Central Asia, from the Caucasus to the Northern Himalayas, has now been dethroned by the unerring fiat of Mercury, and must be content to take a secondary place by the side of his true sovereign Demavend, who has thus recovered a portion of the long lost honours and glories assigned to him in the legend of ancient Persia.

I have, &c.,

Ch. A. Murray.

The principal object of our excursion, of which the following is a brief sketch, was to determine the exact elevation of the Peak of Demavend, a point which has never, we believe, been satisfactorily ascertained. But before doing so, we proposed making a short circuit through the mountainous districts north of the Elbúrz, a locality little frequented even by Persians, and almost entirely unknown to Europeans.

The mountains of Elbúrz, at the foot of the southern slopes of

which the town of Tehran is situated, extend from the Plain of Cazvín on the west to the town of Demavend on the east, forming the division between the low belt of country on the southern shores of the Caspian and the high lands of the central province of Irāk. They are a portion of the lofty chain which branches off from the Caucasus, and after passing through Azerbijan, the North of Persia, and Affghanistan, terminates in the range of the Himalayas. The line of these mountains, though occasionally broken in Persia, especially in Khorassan, where it is intersected by several extensive plains, may easily be traced throughout the whole of this vast tract of Asia. The Elbúrz, although of enormous height, have not a very imposing appearance from the Plain of Tehran. With the exception of the huge cone of Demavend, no peak towers above its fellows, and from a distance the summit of the range seems to be nearly level. In summer the snow disappears almost entirely from the southern face, but on the northern side it remains in large quantities throughout the year. Another reason why they are wanting in the beauties of chains much inferior in height is that the highest range rises immediately out of the Plain of Tehran, throwing out scarcely any spurs, and effectually concealing the vast sea of mountains which extend in a northerly direction.

Like the generality of mountains in Persia, those of Elbúrz are but scantily clothed with vegetation, the plants growing on the slopes having a dry, blighted appearance, and, as usual, there is a total want of trees of natural growth. The colour of the rocks which form the lower part of the chain is in general a reddish brown, varied here and there by huge blocks of grey stone. For about one half of the whole height of the mountain these rocks rise nearly perpendicularly. They are jagged and broken up into deep precipitous ravines, down one or two of which small streams, fed by the melting snow and by springs, force their way into the plain. Above, the slope becomes more gradual, though still very steep, and the rocks are for the most part covered by loose gravel and earth.

If, however, the Elbúrz mountains are poor in vegetation, they are, like many other parts of this extensive range, rich in mineral productions, copper, iron, lead, and orpiment being found in large quantities. The specimens procured are not of any great purity, but having been merely picked off the surface, cannot be considered as showing what the value of the ore might be if scientifically worked. Coal, of excellent quality, is also so abundant in many districts in the immediate vicinity that an inexhaustible supply might be procured at a trifling cost for the purpose of working the mines, but the want of enterprise of the Persian people and the

indifference evinced by the government to all measures of improvement, or schemes for developing the resources of the country, have hitherto caused this source of wealth to be almost entirely neglected, and the working is limited to the extraction of a small quantity of coal for the annual supply of the European residents and the blacksmiths of the capital. No parrot or cannel-coal has hitherto been discovered.

As many as five rivers, besides smaller streams, take their rise in the Elbúrz, within 25 miles north of Tehran. The largest of these is the River of Núr, which flows in a north-easterly direction, and after passing to the north of Demavend, falls into the Caspian west of the flourishing town of Amúl. The next in size is that of Talighan, which flows from the mountains of the same name, and is a tributary branch of the Sefíd Rúd or White River, a large sheet of water entering the Caspian to the east of Resht.

The Heráz or Laur River, which rises near Shahzadeh Kúh, passes through the district of Laurijan to the south of Demavend, and falls into the same sea near the town of Amúl. Salmon, trout, and, near their mouths, sturgeon abound in these several rivers. The remaining two, those of Jajrúd and Kerretch, after descending into the plains of Veramín and Tehran, where a portion of their water is withdrawn by means of canals for the purpose of irrigating the lands belonging to the numerous villages with which these plains are studded, are lost in the great salt desert beyond.

Having made the necessary preparations and provided ourselves with a small tent, a set of Casella's hypsometrical apparatus, and a few other instruments procured from England, we left the summer encampment of the mission at Gulabek on the 11th of July at 5 P.M. The road from Gulabek passes to the north through the large village of Tajrísh about 2 miles distant, and 1 mile farther on through Derbend, a village situated in the mouth of a narrow gorge, which is from its elevation and reputed salubrity of climate a favourite summer resort for the higher classes of Tehran. From Derbend the road becomes more difficult, passing over rocky and uneven ground until the small hamlet of Pess Kalaa (famous for its cherries and wild strawberries) is reached. This path, bad as it is, has been much improved of late years, as it leads to a cascade a little higher on the side of the mountain, which place the Shah occasionally visits during the summer months. The distance from Derbend to Pess Kalaa is about 1 mile. The latter is the last village met with on the southern side of the range of hills, and here we bivouacked for the night on a rock in the open air.

July 12th.—We commenced ascending the mountain at half past

4 A.M., winding over a narrow, rugged path. At about half way to the summit the ascent becomes less abrupt, and the soil of greater depth. Flowers, comprising tulips, crocus, wild lavender, and thyme, besides a variety of other aromatic plants, are to be seen in great profusion, and in many places the slopes of the hills assume a green tint. The rocks and precipices on the lower half of the mountain consist principally of limestone. No quartz was observed by us here or in any other part of the Elbúrz. At that part of the summit where the road crosses the range we turned to the right and proceeded to the highest peak, measuring 12,887 feet above the level of the sea. The peak bears due north of Tehran, of which, as well as of the surrounding plains, it commands an extensive view. On descending from this point, we passed what the Persians call "the sea of ice," a kind of glacier, from which the market of Tehran is abundantly supplied in the hot weather whenever, in consequence of a mild winter, the ordinary provision of that luxury does not suffice for the consumption of the inhabitants. Near this spot we saw a large covey of about 30 "Kebk i derrí," or royal partridges (known also as the Caspian partridge), a bird equal in size to a well-grown turkey, which, we believe, is only known in Persia, and is rarely to be found excepting in the Elbúrz and some of the high lands in Azerbijan. We also observed a number of wild sheep crossing a stony ridge at some distance below us.

The road descends in a north-westerly direction to the valley of Shehristanek, shortly after which we arrived at the principal village of the district, bearing the same name. From Pess Kalaa to the crest of the mountain is about 6 miles, and thence to the village of Shehristanek 4 miles more. This valley runs as nearly as possible east and west, is about 6 miles in length, and a small stream, a tributary of the Kerretch River, flows through its bed. To the east there is another valley, that of Rudbár, opening into the district through which flows the Jajrúd River, and containing, besides some of the rich mines before mentioned, several large and flourishing villages, the most important of which is named Ahar. The two valleys are only separated by a small pass. Shehristanek is at an elevation of 7040 feet.

July 13th.—We proceeded down this valley, which is fertile and well cultivated, the higher slopes of the hills on the southern side being scantily covered with stunted cypress trees. At the western extremity of this district we entered the valley of Laura, its general direction being nearly north and south, and affording a channel for the Kerretch River, named "Doab" at the point of its

junction with the Shehristanek stream, whence the combined waters flow for a distance of 12 or 14 miles through pathless and inaccessible mountains, entering the plain 24 miles west of Tehran. It was from the latter point that Hají Meerza Aghassí, the Prime Minister of the late King of Persia, attempted to cut a canal by which he proposed to supply the plain of Cazvín with a copious stream of water. Native engineers were employed, a vast sum of money was expended, a day pronounced auspicious by learned astrologers was fixed for the opening of this grand undertaking, the minister invited the king to attend the anticipated ceremony with all his court—everything in fact succeeded thus far, and the signal being given, the dams were cut away, when the water streamed for a few yards into the new channel, but there it stopped and still remains, the Kerretch retaining its waters and the plain of Cazvín remaining deprived of an element, the absence of which prevents it from becoming one of the most productive parts of Persia.

July 14th.—The Laura Valley, in general about a quarter of a mile broad and closed in by mountains which rise almost vertically, contains several villages, and is well cultivated throughout its whole extent. The road follows the left bank of the river and passes the village of Meidanek 3 miles from Doab: 2 miles farther on there is another village, Hassanekber, and thence to Níssa is about 2 miles more. Níssa is the principal village of the district, situated in an open valley half a mile from the left bank of the river. Opposite this village on the right bank we skirted the foot of the range of the Talighan Mountains, extending from east to west, their height being equal, if not greater than that of the Elbúrz Peak. The next and last village in this valley is Getchiser, 3 miles from Níssa. Before reaching this point the river is crossed by a wooden bridge, and a little lower down a tributary stream, nearly as large as the Laura itself, flows from a valley on the right bank. The elevation of Getchiser is 7198 feet. At Getchiser the path leaves the river and winds up a steep ravine (at the bottom of which there was still snow in large quantities) to the north-west for a little more than 2 miles, and then, turning to the east, ascends the difficult pass of the Shemlian. The mountains on either side of this ravine are curious from their extreme steepness, being at an angle of 50° or 55°. What renders them the more remarkable is the almost total absence of rock, which only here and there pierces through the thick coating of light sandy soil which slopes in a perfectly even line from the summit to the base. The elevation at the top of the pass is 9620 feet. Here the first view is obtained of the low range of hills

(161 W. of S.) covered with trees and jungle, through which the low country of Mazanderan is entered. The descent on the northern side is equally abrupt, and is also about 2 miles in length.

July 15th.—During the night a heavy dew fell, completely saturating our bed-covering. Although this dew is productive of no bad effect at this elevation, it is otherwise on the shores of the Caspian, where the natives are extremely careful to avoid exposing themselves to it at night. Our path now descended in a parallel line with a rapid stream for four miles, quitting the Mazanderan road on the left at the second mile. This route is only practicable for a few months during the hot season, and is mainly used by the villagers near Tehran, who gain a livelihood by transporting charcoal from Mazanderan to the capital. After two miles course north-east, we entered the Valley of Dúna, through which flows a small mountain stream, joining that which waters the valley we had just left; and together they dash through a magnificent ravine, guarded on either side by large precipices of red sandstone. The district of Dúna is small, containing only two villages of 60 families each. Continuing in a northerly direction, we crossed a mountain-pass, which, compared to the others in the neighbourhood, was neither high nor difficult, and thence descended into a narrow valley, at the eastern extremity of which there is one small village. The distance from Dúna is 3 miles. The valley is called Kamrman, and is the property of the present Prime-Minister of Persia. Elevation 7860 feet. A stream flows through it, which, at a distance of 3 miles north-west, forces its way to the wooded country below through a wild and narrow gorge crowned with precipices of enormous height, which, with the hills above, are partially covered with forest trees.

July 16th.—Two roads lead from the valley of Kamrman—one conducting to the valley of Núr, over a hill to the north of Shahzadeh Kúh; and the other, which we followed, taking a north-easterly direction over the range which forms the boundary between the districts of Kamrman and Núr on one side, and Mazanderan on the other. The summit of this pass shows an elevation of 10,890 feet. To the left of the road a lofty peak rises to the height of 1000 feet above the pass, and to the summit of this we went to obtain a better idea of the country we had crossed. The range we were now upon was of great height, forming the northern limit to the Elbúrz chain. Looking down from its crest we saw below us a low range of well-wooded hills, cut up in several places by deep, rocky gorges, and opening in others into fertile valleys. These gradually diminish in height, and at length disappear in the low level country of Mazanderan. From this peak the Caspian Sea is visible,

in clear weather, at a distance of about 26 miles; but in summer it is seldom seen, owing to the exhalations from the damp and marshy jungles on the coast, which produce a thick haze, effectually concealing the view even from heights much nearer the sea. Opposite to, and south of this point, a huge and jagged rock, which appeared to be inaccessible, in the form of a pinnacle, towers above all the surrounding mountains. It is called the Shahzadeh Kúh, or Prince's Mountain, and is considered by the natives to be the highest peak in the whole range, with the exception of Demavend. There is a tradition among them that Noah's Ark rested upon its rocky peak; and they affirm, with the fullest belief in the story, that a portion of the Ark may still be found near its summit. At the base of this mountain, the Núr and Laur, or Heráz Rivers take their rise. From this pass we crossed the range by a circuitous and rocky path, descending on the Mazanderan side of the hill to a spring of water, the temperature of which was 40° Fah., where we halted for the night. The distance from Kamrman to the top of the pass is 6 miles, and thence to the spring 4. The elevation at this spot is 9438 feet.

Beyond the Valley of Zanús, which lies immediately below, running north-east and south-west, we perceived the valley and extensive district of Kújjúr bearing E. by N. A river passes through Kújjúr, named the Shalis; which, after being joined by two streams flowing down the Zanús and Meekhsay Valleys, empties itself into the sea. We did not visit this district ourselves, but were informed by the natives that it contained numerous villages, and that its waters abound in fish.

July 17th.—Leaving the spring at which we had encamped, we descended by a tortuous path into the forest below. The view here was such as one seldom has an opportunity of seeing in Persia, where trees are so rare. Behind us rose the mountains we had just crossed, the grey crests of which, in the form of huge towers, stood out in bold relief against the clear morning sky. In the ravines which separated these rocks from one another the snow still lay, contrasting with the steep grassy banks which sloped away below, and giving rise to streams which leaped from rock to rock till lost among the trees on the lower portion of the mountain. Around us on all sides forest trees, including oaks, elm, maple, and fir, together with wild apple and pear-trees, clung to the steep sides of the valley, whose banks were also clothed with ferns and other plants. Descending through the valley of Zanús in a north-easterly direction, we passed a few small villages rudely constructed with branches and shingles, occupied by charcoal-burners. The distance to Zanús is 7 miles. This is a large village, within 20 miles of the Caspian in a direct line, and

about 30 by the road. It contains upwards of 100 families, whose houses are built of mud and stone, with pent roofs covered with rough slates and the bark of trees. This was the northernmost point which we reached, and the elevation was lower than at any other place we passed through. Leaving Zanús, we turned sharp round to the right, following a valley which conducted us towards the same range of hills we had crossed the day before. Here are several flourishing villages, the chief of which is Meekhsay, 5912 feet above the sea level. The road continues to ascend this valley for about 5 miles, winding among rocks and forest trees. At this distance we began to climb the mountain, the path, though steep, being neither difficult nor dangerous. The distance to the summit, which is 10,561 feet in height, is about 4 miles. The jungle growth ceases at an elevation of 8500 feet.

July 18th.—Descended to the valley of Núr, through which flows the river of the same name, the course being south-easterly to the village of Ouj, distant 8 miles from the top of the pass. We next passed through the large village of Youssh, situated on the left bank of the river, and halted at the point where the Núr is joined by another large stream flowing from the south. Elevation 6539 feet. The whole of the district of Núr, of which the town of Beledeh, situated at the eastern or lower extremity of the valley, half-a-mile below the junction, is the capital, belongs to Meerza Agha Khan, the present Prime-Minister of Persia, whose family has held the property for several generations. It is populous and well cultivated, and at present derives no little importance from its being the native place of the principal functionaries under the present administration of Persia.

July 19th.—Left Núr, and followed the course of the Yalú River already mentioned. One mile from the junction we passed the village of Púlvek, where the Yalú River is joined by a considerable stream of the purest water flowing from the south-west. We proceeded up the Yalú, and after following its course between rocky mountains for some distance, we entered a small valley, containing two villages, March and Yalú, also the property of the Prime Minister. The distance to Yalú is 4 miles. Here the Yalú river again divides into two portions—one flowing from the east through a narrow ravine, and the other coming down from the mountains to the south. This latter we followed.

The mountains above Yalú are formed of a white friable stone, probably gypsum. The road, after proceeding up the left bank of the stream for about a mile, crosses it by a bridge of stone at the mouth of a dark, narrow gorge, shut in by stupendous precipices

400 feet high, between which the river rushes furiously. The path up this gorge is dangerous in the extreme: in places it traverses the face of the precipice overhanging the torrent, which one can hear as it roars and boils in whirling eddies far below; and in others, the low parapet which had been built by the side of the narrow path as a slight protection had entirely fallen away, rendering the passage perilous even to the sure-footed mules, for which Northern Persia is famous. It would be difficult, however, to find a finer gorge than that through which we were passing. After about 1½ or 2 hours, having attained a considerable height, we emerged upon an open chummun,* in which we found several camps of Eeliats, or nomades, who in summer seek these high elevations on account of the fine pasturage the mountains afford to their innumerable herds. Passing along this for about 3 miles, we came to the foot of another pass, very steep and high, and which it took us an hour and a half to ascend. Here we were caught by a thunder-storm, which however did not prevent us from taking the elevation, found to be 10,851 feet. The descent on the other side is neither so long nor steep as the ascent, but it is more rocky. Among other descriptions of rock we discovered coal of inferior quality in many places. At the foot of the pass, as on the other side, is built a wretched caravanserai, intended as a protection to travellers who may venture to cross these hills in the early spring or late autumn. To the left, descending from the rocks by innumerable falls, flowed the Sefíd Aub. This waters a fine open valley, covered with grass, and everywhere dotted with the tents of Eeliats. We followed this stream for about 2 miles, when we entered the valley of the Laur River flowing from the north-west, and it being dark, we pitched our tent on its banks for the night.

July 20th.—Walked down the banks of the stream, which is fed by numberless springs, and whose sides are clothed with grass. The width of the valley is about ¾ of a mile. After about 6 miles it opens out considerably, so much so that the space almost deserves the name of a plain, being about 4 square miles in extent. After this it narrows again, the river passing between two rocks which rise immediately out of its banks. Beyond these we found the camp of Mr. Murray and the Mission pitched at a pleasant spot named Chehel Cheshmeh,† or the Forty Springs, from the numerous fountains of clear water which well up out of the rocks and the plain in every direction.

The first part of our trip was now concluded, the most important part

* Meadow.

† Elevation, 7833 feet.

—namely, the ascent of Demavend—being still to be accomplished. The mountains through which we had passed are generally of the same description, one being much like another, and formed chiefly of limestone. Between them run valleys, very narrow, and almost entirely wanting in trees except those planted by the inhabitants, which consist of poplars, walnut, and mulberry. Barley, bearded wheat, and clover, together with enormous quantities of butter and cheese, form the staple commodities of these districts. In winter the inhabitants are unable to move out from the depth of snow which covers the ground, and they are forced to remain under the cover of their rude huts, together with their flocks and herds, for which during the summer months they lay in a large stock of grass and dried plants from the mountains.

The inhabitants, nevertheless, seem happy and contented; their isolated position among the hills no doubt leaving them free and untouched by many of the exactions and cruelties to which the better known provinces of Persia are subjected. Another cause which may add to the prosperity of some of these villagers is the constant passage during the summer of caravans of mules carrying charcoal from Mazanderan to the capital.

Game does not exist in large quantities in these mountains: several varieties are, however, met with. The Kebk i derrí, a magnificent partridge, already mentioned, we found in several places. There are besides two other kinds of partridge, the Kebk and the Teihú, in considerable numbers. Quail in abundance during the summer months, and in the autumn snipe are to be found in the valleys. Birds of prey, of great size and in vast numbers, are to be seen; they are chiefly vultures and hawks, eagles being rarely met with. Of four-footed animals the wild sheep, or mouflan, and ibex are the only remarkable ones. Hares are in some places frequently found. All the rivers in this district, with the one unaccountable exception of the Jajrúd, are well stocked with trout.

On the 24th of July, shortly after daylight, we left the Mission encampment, and proceeded for about 3 miles along the right bank of the river, which here winds down the centre of a wide grassy valley.

Two miles and a half below the Chehel Cheshmeh the Heráz is joined by a smaller stream, which takes its rise at about 10 miles distance among the mountains to the north-west of Demavend. It is named the Sefíd Rúd, or White River (this name is also given to several other rivers in Persia), on account of the extraordinary milky

appearance of its waters. On reaching the end of the Valley of Laur, we crossed the river, and about ¼ of a mile farther on passed over a torrent fed by the melting snows from the mountains to the north. After its junction with this stream, the Heráz dashes down a rocky ravine, whose sides are so precipitous and narrow that, even 200 feet above the level of the torrent, only a few feet intervene between one side and the other. The path here leaves the river and winds high up over the spurs of the mountain. It is rocky and difficult, being in many places almost impassable for horses. Now and then, however, we crossed fine open chummuns or grassy plains, in which great numbers of mares of the royal stud were turned loose for pasture.

We had not proceeded very far before our track joined the high road, if such it can be called, which leads from Tehran by way of the town of Demavend to Ask, the capital of the district of Laurijan, and the residence of its governor.

The hot baths of Demavend, so famous in Persia, are situated in this locality. They are two in number: one, the tepid bath, is situated within 100 yards of the town of Ask, on the right bank of the river. It rises in an oval basin, measuring about 30 feet by 20, and about 3 feet in depth, formed by deposit from the spring, which gushes up with great force in the centre of the basin, together with a considerable amount of gas. The water is composed of sulphur, iron, soda, and magnesia.

The other spring, which is situated about 2 miles farther down the valley, and on the mountain of Demavend, is so intensely hot that the water has to be conducted through canals for some distance before it is collected in an artificial basin, in which the patients bathe. This water is also composed of magnesia, iron, and sulphur; but the latter is in much larger proportions, and naphtha in great quantities also forms one of the ingredients. Near Ask there is also a spring of cold water, strongly impregnated with iron. From Ask a road leads down to the town of Amúl, but it is extremely dangerous, lives being lost annually from mules and their riders falling over the precipice, along the face of which it runs.

Having on a previous occasion visited the town and hot springs, we avoided the descent into the deep valley in which they are situated by following a track which led along the face of a precipice formed of basaltic rock. The path was difficult, and in many places dangerous. After an hour of this work we came upon a level piece of ground, on which is situated the large village of Reinah.* We did not stop here, but pushed on to a point about a mile farther on,

* Elevation, 6618 feet.

where the guides, &c. necessary for the ascent were waiting for us. The distance from Laur to this place is about 18 miles.

The lower portion of the mountain of Demavend does not differ much from its neighbours. In fact, if anything, it is perhaps less steep and difficult to ascend. It consists chiefly of long high ridges, which commence at the foot of the cone, and run out for some distance, when they end abruptly. The valleys and ravines between these ridges are deep, and for the most part covered with loose stones, gravel, and earth. Here and there huge volcanic rocks pierce through the outer covering, breaking the larger valleys into ravines. Strange to say, there are but few springs on this mountain.

We commenced the ascent by proceeding up an even slope covered with large stones, between which flowers of different descriptions sprung up in great variety. On reaching the top of this slope we entered a narrow ravine of excessive steepness. In 1855, when we first made the ascent of Demavend, we found a tolerable track up this ravine, but a torrent having swept with great violence over this part of the mountain during the last winter, all traces of it had disappeared.

The ascent of this ravine was consequently painful and fatiguing in the extreme, the loose stones rolling away from under our feet at every step. Having at length gained the top, we found before us a large extent of ground covered with huge shapeless blocks of basalt, over which we made our way with some difficulty. Beyond this we had to cross at right angles a ravine filled with snow, and extremely steep. There is, however, not much danger in crossing this if caution be used, except in the early morning, when the snow being frozen, one is liable by a slip to be precipitated some hundred feet into the valley below. After this the ground becomes more practicable—it is very steep, but covered with a firm soil of reddish colour, on which plants of great variety grow in considerable numbers. Among others, we noticed the forget-me-not, wild thyme, lavender, and ferns, besides a beautiful variety of the everlasting flower, of most delicate form and colour. This plant we found at a higher elevation than any other. After a fatiguing walk of four and a half hours we reached a small tent we had before sent on, and which was pitched some distance below the foot of the cone, by a spring of water.

The elevation of this point is 12,664 feet, and shortly above it vegetation ceases. The temperature of the air in the tent was not so low as might have been expected, the mercury falling no lower than 39° Fah., but outside the cold must have been intense, for a stream which during the day flows from the melting snows above,

and is both very rapid and of considerable size, was completely frozen during the night, the water appearing to have been suddenly arrested in its course, and only beginning to flow again when the rays of the sun had played for some time on the solid mass of ice.

July 25th.—For the third time we were now about to attempt the ascent of the cone of Demavend. On the first occasion we failed, being obliged to return by a storm of wind and snow. The second time we succeeded in reaching the top, but having no instruments, we were of course unable to make any observations. On the two previous occasions the mountain was much more covered with snow than we now found it to be. In fact, the guides told us that they had never seen so little remaining. Many places which before we found covered with snow to a great depth, were, though a month earlier in the season, now quite bare; and in many places even the glaciers which fill some of the ravines intersecting the mountain-side had partially disappeared.

The cone of Demavend is doubtless of volcanic origin, and appears to have been formed partially by having been forced up above the level of the mountain by some subterranean agency, but more by the débris and lava thrown out from the summit when the volcano was still in activity. From a distance it appears to be nearly smooth, and to slope evenly at an angle of about 45° from the top to bottom. On a nearer approach, however, it becomes evident that the cone consists of a number of ridges, which run from the summit to the base, leaving between them deep ravines filled in general with snow and ice, beneath which lies a mass of débris fallen from the upper part of the mountain.

At an early hour after dawn on the 25th we quitted the tent, and after proceeding for above a mile over ground covered with loose gravel and large masses of stone, reached the foot of the snow, where the cone of Demavend may be considered to commence. For about 2 hours we then climbed over rocks of lava and basalt broken up into a thousand shapeless masses, and piled in confusion one above the other. At the top of this we scrambled up a small precipice of about 30 feet, and then found before us a long ridge, perfectly even, and evidently formed by a stream of lava having run over the surface, leaving it so smooth and steep that it was somewhat difficult to keep our footing. Before leaving the tent, the guides had made us take off our own shoes, and had tied round our feet pieces of ox hide. We now found the use of this, the hide clinging tenaciously to the rock, where ordinary boots must inevitably have slipped. The ascent of this portion of the mountain was attended with great fatigue, especially as the rarefaction of the air began to tell upon our

lungs. After 2 hours more we reached another precipice higher than the last. This we surmounted without difficulty, and then found to our right a precipice of enormous depth. Opposite rose another, whose rocks, however, unlike those on which we were standing, were of a reddish-yellow colour, apparently composed of sulphur and lime. The space below was filled with ice and snow. Skirting along the edge of this precipice we came, after about 1½ hours, to Bamshí Bend, or Cats' Pass, in Mazanderaní dialect. This, though somewhat unpleasant from its great height, was this time comparatively safe and easy. On the last occasion on which we made the ascent, we were forced to cut steps in the ice with hatchets in order to obtain footing; we also took the precaution of attaching ropes in case we should fall. Now there was no ice, and but little snow. The elevation below this pass is 18,509 feet. Above this we had again to scramble over blocks of basalt such as we had met with at the commencement of the ascent. This continued for about an hour, after which, except in one or two places, the ascent was rather less steep. We now crossed a long space covered entirely with soft gravelly soil, consisting apparently of limestone and disintegrated rock of various descriptions, together with crystals of sulphur which lie about in large quantities, and of great purity. Beyond this rises the last ascent, up a steep slope, among rocks of a light yellow colour, formed of limestone and sulphur.

The last part of the ascent from the Bamshí Bend was extremely painful from the rarefaction of the air. We were attacked with nausea and violent headaches, and experienced great difficulty even when at rest in drawing breath. Monsieur de St. Quentin, of the French Mission, and M. Castelli, a Sardinian gentleman, who hearing of our intended expedition had asked to accompany us, were also attacked in the same manner. Having recovered a little from our fatigue, we proceeded to take observations of the height of the mountain. This we ascertained to reach the enormous height of 21,520 feet.

The cone of Demavend terminates in a crater about 85 yards in diameter, which is nearly surrounded by jagged rocks. These are highest on the northern and southern sides. They are not, however, everywhere of the same composition: to the north and west they are of the same basalt of which we had seen so much in ascending the mountain, while to the south and east they are composed of sulphur and lime. The basin of the crater was almost entirely filled with snow, upon which we did not venture more than a few yards, as we found that it increased in depth at every step. There are two caves near the summit, one 100 feet below the eastern side of the

crater, and about 16 feet deep by 5 broad; the other, lower down to the south-east, and much smaller. From both of these caves issues a steam strongly impregnated with sulphur, which forms in crystals over the whole interior surface. Not only from these points, but from many small holes in the rocks, this steam issues in strong jets. We had intended to pass the night in one of the caves, but found it impossible to do so from the rarefaction of the air, and from the effect which the sulphuric vapours had upon us. Below the cave, and to the north-east side of the cone, there is a large glacier, at so steep an angle as to be altogether impracticable. It was smaller this year than in 1855, but the blue points of ice stretching away far below still presented a fine appearance. We had made the ascent on the south-eastern side of the mountain, and the path we had followed appeared to be nearly the only practicable one.

We were unfortunate in the day we selected for the ascent. The morning had been clear, but by the time we reached the Bamshí Bend the weather had changed, and a heavy fall of snow continued during the whole time we were at the summit, the thermometer descending to 29° Fah. in the open air. This prevented us from obtaining a view, such as we had enjoyed on our previous ascent, which was both extensive and magnificent.

We remained at the top for about an hour and a half, and then descended by one of the ravines, taking advantage of the snow, wherever we found it, to slide down.

The next day we returned to the Mission Camp at Laur by the same road which we had followed two days before.

The height of the mountain, the ascent of which we have just made, took us much by surprise. From Tehran and the neighbouring hills, though always a conspicuous and remarkable object, it fails entirely to give a correct idea of the real elevation, which is, as before stated, 21,520 feet. This can only be accounted for by the fact that between it and the observer, from this side, there exist other ranges of great height, which must necessarily have the effect of dwarfing any object behind them; and also that Tehran itself is at an elevation of 3600 feet. From Mazanderan, however, the view of this great mountain is truly grand: thence the whole of its enormous height unbroken from the summit to the base is seen, and that from a point 80 feet below the ordinary level of the sea.

It may therefore be as well to record the observations upon which we base the statement of the height of Demavend.

Tehran is known from repeated observations to be 3600 feet above the level of the sea. The instruments used were hypsometrical apparatus by Mr. Casella, 23, Hatton Garden, and the results of the

observation we worked out according to the tables of heights and corrections furnished with the instruments. We, on most occasions, took the observations with more than one thermometer, but those here mentioned were shown by Casella's thermometer, No. 161, as registered and rectified at the Royal Observatory of Kew.

Station.	Boiling Point.	Hour.	Temperature.
			°
Tehran	205·2	7 A.M.	76
Laur	197·8	6·30 A.M.	64
Reinah	199·9	11 A.M.	83
Foot of the Cone	189·4	6 A.M.	42
Below Bamshí Bend	179·7	1 P.M.	44

The instruments not allowing of any greater height being taken by their means, we were reduced to the necessity of boiling a common thermometer, to ascertain the boiling point at the summit. The accuracy of our observation may however be relied upon, for after carefully comparing this common thermometer with that furnished by Casella, we could distinguish no observable difference. Apart from this, we may observe, that from the point where the other thermometer was no longer available to the top we were nearly 3 hours walking, without stopping anywhere beyond what was necessary for resting, during which time we could have scarcely mounted less than 3000 feet.

The observation was taken in the cave 100 feet from the summit. The boiling of the thermometer was complete and satisfactory, we having provided ourselves with charcoal to be prepared in case of need.

In conclusion, we may mention that we do not pretend to any scientific acquirements whatever. The above is only a statement of what we saw and observed, which may however prove somewhat interesting from the fact that nearly all the country we have explored has been hitherto almost, if not altogether, unknown to European travellers.

Several specimens of sulphur from the summit of Demavend, and a few specimens of mineral found in the Valley of Rudbár, are transmitted with this paper, together with a map giving an outline of the route we followed.

The PRESIDENT.—Whatever comments may be made upon this paper, and upon the method employed to determine the height of the mountain Demavend, you will all agree with me that the greatest possible credit is due to the two gentlemen attached to Her Majesty's Mission in Persia, who have employed themselves so energetically in the furtherance of geographical science. Mr. Murray gives his young friends every credit for what they have done, and

no more praise than they really deserve; and he expresses his opinion that the present communication, and the observations upon which it is founded, have deprived Mount Ararat of that superior altitude in the Eastern world which has hitherto been attributed to it. But the fact is, that geographers, particularly the venerable Humboldt, have not placed the Ararat of geographers in this category. I have looked into the last volume of 'Cosmos' to-day, and Humboldt records the height of Demavend at 19,715 feet, which is but 1785 feet under the height attributed to it by our diplomatists. According to Humboldt, Ararat is only 17,112 feet high.

General Monteith, F.R.G.S.—Having passed three years at the foot of Mount Ararat, I am well acquainted with that mountain. I used many means to ascertain its elevation, and I made it 16,000 feet above the level of the Araxes—I mean the Ararat of modern geographers, in the province of Erivan. I was not so fortunate as to reach its summit—though I attempted the ascent with several men—in consequence of the mountain being so thoroughly capped with ice. With regard to Mount Demavend, I have seen it, but did not attempt to ascend it—not from want of curiosity, but from want of time. I had the opportunity of seeing the Demavend from the summit of one of the range of mountains across the Caspian Sea. The distance from me was 248 miles, and I was at an elevation of 7000 feet at the time. I hurried down to the village to get instruments, but unfortunately I missed the opportunity of seeing the mountain again.—Near the village of Khoor, at the foot of the mountains between Ardabet and the Caspian, though I had a tent and guard for seven days, the atmosphere was never again clear of mist. The Mount of Demavend appeared to me not to be more than twice the height of the general range, and of the same I was on, which by boiling water gave 7000 feet above the Caspian. Ararat, I may say, in appearance at least, is higher than any mountain in Persia, or even the Caucasus. One-third of the mountain is buried in perpetual snow and ice, so as to reflect a strong light like glass when the sun shines on it; in this particular it differs from any other mountain I have seen.

The second Paper read was:—

2. *Expedition from Moreton Bay in Search of Leichhardt and Party.* By Augustus Charles Gregory, Esq. (Gold Medallist, R.G.S.).

8*th Dec.* 1857.—Having received instructions from the Honourable the Secretary for Land and Public Works to organize an expedition for the purpose of searching for traces of Dr. Leichhardt and party, who left New South Wales in 1848 with the intention of proceeding overland to Western Australia, I proceeded to Moreton Bay (11*th Jan.* 1858) with such portions of the equipment as had been prepared in Sydney.

On reaching Ipswich forty horses were purchased, and having despatched the stores to Mr. Royd's station, on the Dawson River, by drays, the party was collected at that place; but, owing to unforeseen delays in the transport of the stores, the equipment and organization of the expedition were not complete till the latter part of March.